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Pesticide Fact Sheet Number 107: Heptachlor

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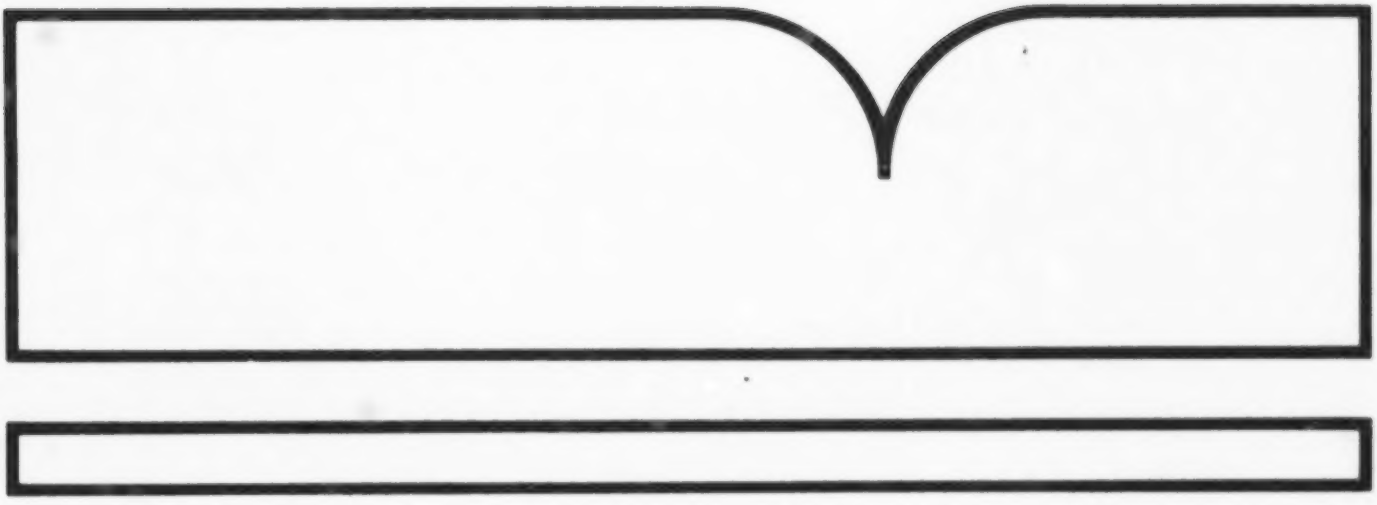

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This document contains up-to-date chemical information, including a summary of the Agency's regulatory position and rationale, on a specific pesticide or group of pesticides. A Fact Sheet is issued after one of the following actions has occurred.

1. Issuance or reissuance of a registration standard,
2. Issuance of each special review document,
3. Registration of a significantly changed use pattern,
4. Registration of a new chemical, or
5. An immediate need for information to resolve controversial issues relating to a specific chemical or use pattern.

17. Document Analysis a. Descriptors

Pesticides, regulations, Chemical Information Fact Sheet, Use Patterns, Science Findings

b. Identifiers/Open-Ended Terms

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EPA

Pesticide Fact Sheet

Name of Chemical: HEPTACHLOR
Reason for Issuance: REGISTRATION STANDARD
Date Issued: DECEMBER, 1986
Fact Sheet Number: 107

1. DESCRIPTION OF CHEMICAL

Generic Name (Chemical): 1,4,5,6,7,8,8-heptachloro-3a,4,7,7a-tetrahydro-4,7-methano-1H indene

Common Name: Heptachlor

Trade and Other Names: 1,4,5,6,7,8,8-heptachloro-3a,4,7,7a-tetrahydro-4,7-methanoindene; E-3314; Velsicol 104; Heptagran; Heptalube; heptachlore; Drinox H-34; Gold Crest H-60; Heptamul; and Heptox

EPA Shaughnessy Code: 044801

Chemical Abstracts Service (CAS) Number: 76-44-8

Year of Initial Registration: 1952

Pesticide Type: Insecticide

Chemical Family: Chlorinated cyclodiene

U.S. and Foreign Producers: Velsicol Chemical Corporation

2. USE PATTERNS AND FORMULATIONS

Application Sites: soil surrounding wooden structures for termite control; control of fire ants in buried cable closures; above ground structural application for control of termites and other wood-destroying insects.

Types of Formulations: emulsifiable concentrates; granular

Types and Methods of Application: trenching, rodding, subslab injection, and low pressure spray for subsurface termite control; caulking gun, trowel or brush for applying to structural wood

Application Rates: 0.06 to 1.0% emulsion for termite control; 0.2 0z/buried cable closure size 1 sq.ft.

3. SCIENCE FINDINGS

Summary Science Statement

Heptachlor is a chlorinated cyclodiene with moderate acute toxicity. The chemical has demonstrated adverse chronic effects in mice (causing liver tumors). Heptachlor may pose a significant health risk of chronic liver effects to occupants of structures treated with heptachlor for termite control. This risk may be determined to be of regulatory concern, pending further evaluation. Heptachlor is extremely toxic to aquatic organisms and birds. Heptachlor is persistent and bioaccumulates. Heptachlor may have a potential for contaminating surface water; thus, a special study is required to delineate this potential. Applicator exposure studies are required to determine whether exposure to applicators may be posing health risks. Special product-specific subacute inhalation testing is required to evaluate the short-term respiratory hazards to humans in structures treated with heptachlor. An inhalation study of one year duration using rats is required to assess potential hazards to humans in treated residences from this route of exposure. 6he Agency has been apprised of reported cases of optic neuritis associated with termiticide treatment of homes with a related cyclodiene, chlordane. To determine whether this is a significant health effect, and whether heptachlor plays a role, the registrant must have eye tissue from the required two-year rat oncogenicity study analyzed by neuropathologists specializing in optic tissue pathology. Data available to the Agency show an occurrence of misuse and misapplication of heptachlor. The Agency is requiring restricted use classification of all end-use products containing heptachlor. Application must be made either in the actual physical presence of a Certified Applicator, or if the Certified Applicator is not physically present at the site, each uncertified applicator must have completed a State approved training course for termiticide application meeting minimal EPA training requirements and be registered in the State in which the uncertified applicator is working.

Chemical/Physical Characteristics of the Technical Material

Physical State: Crystalline solid
Color: White
Odor: Mild camphor-like odor
Molecular weight and formula: 373.3 - $C_{10}H_5Cl_7$
Melting Point: 95 to 96°C
Boiling point: 135-145°C at 1-1.5 mmHg
Density: 1.65-1.67 g/ml at 65°C
Vapor Pressure: 0.0003 mmHg at 25°C
Solubility in various solvents: Soluble in ethanol, xylene, carbon tetrachloride, acetone and benzene; practically insoluble in water
Stability: Stable in daylight, air, moisture, and moderate heat

Toxicology Characteristics

Acute Oral: Data gap (except for a 74% technical formulation which showed the oral LD_{50} value for male and female rats to be 208 mg/kg and 158 mg/kg, respectively. This places the 74% technical into Toxicity Category II).

Acute Dermal: Data gap

Primary Dermal Irritation: Data gap

Primary Eye Irritation: Data gap

Skin Sensitization: not a sensitizer.

Acute Inhalation: Data gap

Subacute inhalation (2-week product-specific test) using rats or guinea pigs: Data gap

Chronic Inhalation (1-year) using rats: Data gap

Major routes of exposure: Inhalation exposure to occupants of treated structures; dermal and respiratory exposure to termiticide applicators.

Delayed neurotoxicity: does not cause delayed neurotoxic effects.

Oncogenicity: This chemical is classified as a Group B_2 oncogen (probable human oncogen).

There are three long-term carcinogenesis bioassays of heptachlor in mice which were independently conducted by investigators affiliated with the National Cancer Institute, the International Research and Development Corporation, and the Food and Drug Administration. Reported in these studies were significant tumor responses in three different strains of mice (C_3H, CF_1, and $B6C3F_1$) in males and females with a dose related increase in the proportion of tumors that were malignant. Available data from five existing carcinogenicity bioassays in rats are inadequate and inconclusive and a well-designed study in rats for heptachlor epoxide is needed to determine the carcinogenic potential of heptachlor in this species.

Chronic Feeding: Based on a dog chronic feeding study with heptachlor epoxide, a Lowest Effect Level (LEL) of 0.0125 mg/kg/day for liver effects has been calculated.
Data gaps exist for rodents and non-rodents for heptachlor epoxide; and for heptachlor in non-rodents.

Metabolism: In biological systems, heptachlor is readily epoxidized to heptachlor epoxide.

Teratogenicity: Data gap

Reproduction: A NOEL of 1.0 ppm has been set for reproductive effects to the young; the liver is the target organ of effect.

Mutagenicity: Sufficient evidence exists to conclude that neither heptachlor nor heptachlor epoxide possess mutagenic activity in bacteria. Further testing is required to fulfill mutagenicity testing requirements in all three categories (gene mutation, structural chromosome aberrations and other genotoxic effects).

Physiological and Biochemical Characteristics

The precise mode of action in biological systems is not known. In humans, signs of acute intoxication are primarily related to the central nervous system (CNS), including hyperexcitabilty, convulsions, depression and death.

Environmental Characteristics

Data gaps exist for all applicable studies. However, available supplementary data indicate general trends of heptachlor behavior in the environment. Heptachlor is persistent and bioaccumulates. Heptachlor is not expected to leach, since it is insoluble in water and should adsorb to the soil surface; thus it should not reach underground aquifers. However, additional data are necessary to fully assess the potential for ground-water contamination as a result of the termiticide use of heptachlor.

Ecological Characteristics (technical grade)

Avian oral toxicity: Data Gap

Avian dietary toxicity (8 day): 92, 224 and 480 ppm in Bobwhite quail, pheasant and mallard duck, respectively.

Freshwater fish acute toxicity (96 hr. LC_{50}): 13 ug/L for bluegill; 7.4 ug/L for rainbow trout.

Freshwater invertebrate toxicity (48 hr. or 96 hr. EC_{50}): 42 ug/L for Daphnia pulex; 1.1 ug/L for Pteronarcys.

4. Required Unique Labeling and Regulatory Position Summary

° EPA is currently evaluating the potential human health risks of 1) non-oncogenic chronic liver effects, and 2) oncogenic effects to determine whether additional action on heptachlor may be warranted.

° In order to meet the statutory standard for continued registration, retail sale and use of all end-use products containing heptachlor must be restricted to Certified Applicators or persons under their direct supervision. For purposes of heptachlor use, direct supervision by a Certified Applicator means 1) the actual physical presence of a Certified Applicator at the application site during application, or 2) if the Certified Applicator is not physically present at the site, each uncertified applicator must have completed a State approved training course in termiticide application meeting minimal EPA training requirements and be registered in the State in which the uncertified applicator is working; the Certified Applicator must be available if and when

needed.

° In order to meet the statutory standard for continued registration, heptachlor product labels must be revised to provide specific disposal procedures, and to provide fish and wildlife toxicity warnings.

° The Agency is requiring a special monitoring study to evaluate whether and to what extent surface water contamination may be resulting from the use of heptachlor as a termiticide.

° A new two-year rat oncogenicity study is needed to determine the carcinogenic potential of heptachlor epoxide.

° Special product-specific subacute inhalation testing is required to evaluate the respiratory hazards to humans in structures treated with termiticide products containing heptachlor.

° Evaluation of eye tissue from the required two-year rat oncogenicity study is required to determine whether heptachlor's termiticide use may be causing optic neuritis in humans.

° The Agency is requiring the submission of applicator exposure data from dermal and respiratory routes of exposure.

° While data gaps are being filled, currently registerd manufacturing use products and end use products containg heptachlor may be sold, distributed, formulated, and used, subject to the terms and conditions specified in the Registration Standard for heptachlor, and any additional regulatory action taken by the Agency. Registrants must provide or agree to develop additional data in order to maintain existing registrations.

5. TOLERANCE REASSESSMENT

No tolerance reassessment for heptachlor is necessary, since there are no longer any food or feed uses. EPA is proceeding to revoke existing heptachlor tolerances and replace them with action levels. A final rule is scheduled for publication in the Federal Register in early 1987.

6. SUMMARY OF MAJOR DATA GAPS

° Hydrolysis

° Photodegradation in Water

- Aerobic Soil Metabolism
- Anaerobic Soil Metabolism
- Leaching and Adsorption/Desorption
- Aerobic Aquatic Metabolism
- Soil Dissipation
- Chronic Toxicity Studies- Rodents and Non-rodents
- Teratogenicity
- Rat Oncogenicity Study
- Mutagenicity Studies
- Acute Toxicity Studies
- Optic Tissue Pathology
- Special Surface Water Monitoring Studies
- Applicator Exposure Studies
- Indoor Air Exposure Studies
- Special Product-Specific Subchronic Inhalation Study (Two-week duration using rats or guinea pigs)
- Subchronic Inhalation Study (One-year duration using rats)
- Avian Acute Oral Toxicity
- All Product Chemistry Studies

7. CONTACT PERSON AT EPA

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